DEMONSTRATION OF HOW A RISK PROCESS MIGHT WORK FOR THE AQI MONITORING PROJECT

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INTRODUCTION

The following process uses multiple sets of criteria to rank specific pathways by pest risk. These rankings are relative in nature and not absolute -- in other words a numerical ranking that a pathway receives will make no sense by itself, but only when compared to other pathways which have also been assessed using this process.

This process was designed so that all pathways can be compared depending upon the needs of the monitoring project. A pathway is defined in this report as *"any means that allows the entry of a quarantine pest into the United States"*. What will be compared is therefore up to the AQI monitoring committee since all conceivable pathways could be compared. For example, a pathway could be considered an AQI port, a series of AQI ports, a conveyance, a series of conveyances, a mode of entry, or a specific commodity. For example one could compare the risks between:

- Mexican land crossing vehicles with Canadian land crossing vehicles
- Airport Cargo with Maritime Cargo
- Direct ships with coastwise ships
- Iris cut flowers from Asia with Protea cut flowers from Africa
- Airline passengers from South America with airline passengers from Europe
- Lettuce coming into Miami via Airport Cargo with Cork bark coming into Baltimore via sea freight

The purpose of this report is for demonstration purposes only. I have tried to be as logical (accurate) as I could in the short time I had to put this together, but have little doubt that a much better job can be done on the criteria sets or on the assigned numbers used for the ranking process. I have also simplified it to the extreme, again for demonstration purposes. The more criteria you have in the final risk assessment the greater the accuracy will be.

I have divided the risk process into two parts. The first is the Interception Ranking Factor (IRF) with is derived from a specific interception of one or more actionable pests (pests which would result in quarantine action against the pathway in which it was found). The IRF is calculated and recorded for each species of actionable pest found (each 309 form). The second part of the process calculates the Pathway Ranking Number (PRN). The PRN is calculated from AQI monitoring data (number of estimated actionable pests moving in that pathway) multiplied by the IRF. The PRN of one pathway can then be compared to the PRN of any other pathway.

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PART 1:

Again part one will be completed on each 309 form in which an actionable pest is identified.

STEP 1 -- QUARANTINE PEST CRITERIUM

This criterium is used to reflect the impact if the pest becomes established.

The quarantine pest criterium used in this process is the same process used by BATS in their *"Enhanced Hazard Risk Assessment For Determining the Quarantine Status of Exotic Organisms"* (see Appendix I). The reason for employing this process is that it is already in use for the evaluation of intercepted AQI pests.

For AQI monitoring purposes only those *"risk categories"* under *"Quarantine Action Required"* are used (see last page of Appendix I). These risk categories are arranged in descending risk and ranked for AQI monitoring use.

Risk Categories	Numerical Rating	Verbal Rating
HHH	5	High
HHM, HMH, MHH, MHM	3	Medium
HMM, HMU, HUM, MUM, LHM, LUM	1	Low

The Numerical Rating becomes the "Quarantine Pest Number"

STEP 2 -- DESTINATION CRITERIUM

This criterium is used to reflect the likelihood of establishment.

No criterium at present exists to cover destination. The following is for demonstration only.

Description	Numerical Rating	Verbal Rating
Going to a state where host plants are readily available and/or pathway is propagative material	5	High
Pathway is not propagative material and is going to a state adjacent to where host plants are readily available or to a state where host plants are present but uncommon enough that pest establishment will probably not occur or associated with cargo in which destination (in part) will likely go to one of the above.	3	Medium
Pathway is not propagative material and is going to a state where the hosts are not present or is adjacent to a state where the host plants are present but uncommon enough that pest establishment will probably not occur	1	Low

The Numerical Rating becomes the "Destination Number".

STEP 3 -- CALCULATION OF THE INTERCEPTION RANKING FACTOR (IRF)

The IRF is simply the product of the *"Destination Number"* and the *"Quarantine Pest Number"*. The IRF therefore equals the Numerical Rating.

Quarantine Pest #	Destination #	Numerical Rating (IRF)	Verbal Rating
5	5	25	High
5	3	15	Medium
3	5	15	Medium
3	3	9	Medium
5	1	5	Low
1	5	5	Low
3	1	3	Low
1	3	3	Low
1	1	1	Low

PART 2:

STEP 4 -- CALCULATION OF THE PATHWAY RANKING NUMBER (PRN)

The PRN is the sum of the products of multiplying the IRF with the total number (both intercepted and missed) of specific quarantine pests calculated by AQI monitoring to be in the pathway (over a specific period of time). It is the Pathway Ranking Number which is used to compare the relative risk between pathways.

Example 1: Comparing Airport Cargo, Airport Passengers, and Maritime Cargo at the Port of Baltimore during FY 1997.

IRF Ranking	# of QP est.* Air Cargo	Calc.** Air Cargo	# of QP est. Air Pass.	Calc. Air Pass.	# of QP est. Mar. Cargo	Calc. Mar. Cargo
25	4	100	3	75	1	25
15	1	15	6	90	8	120
9	15	135	38	342	1	9
5	35	175	116	580	23	115
3	9	27	0	0	16	48
1	13	13	8	8	19	19
Total		PRN = 465		PRN=1095		PRN = 336

Therefore, the relative pest risk would rank Airport Passengers as first (PRN = 1095), next would be Air Cargo (PRN = 465), and last would be Maritime Cargo with a PRN of 336.

* = (# of QP est.) = Total number of Quarantine Pests estimated by "AQI monitoring project" to be moving along the pathway.

** = (Cal.) = The product of the "IRF Ranking" times the "# of QP est.".

Example 2: Compare AQI land border, AQI seaports, and AQI airports in the Continental United States for the month of July (1997).

IRF Ranking	# of QP est. Land	Calc. Land	# of QP est. Sea	Calc. Sea	# of QP est. Air	Calc. Air
25	180	4500	342	8550	300	7500
15	45	675	260	3900	145	2175
9	115	1035	138	1242	111	999
5	135	675	116	580	123	615
3	98	294	1208	3624	116	348
1	13	13	318	318	219	219
Total		PRN = 7192		PRN = 18214		PRN = 11856

Therefore the relative pest risk would rank Sea Ports as highest (PRN = 18214), next would be Air Ports (PRN = 11856), and Land Ports with a PRN of 7192.

Example 3: Comparing Apples, Mangoes, and Oranges at the Port of New York during FY 1997.

IRF Ranking	# of QP est. Apples	Calc. Apples	# of QP est. Mangoes	Calc. Mangoes	# of QP est. Oranges	Calc. Oranges
25	4	100	2	50	8	200
15	0	0	6	90	18	270
9	4	36	4	36	12	108
5	3	15	16	80	23	115
3	3	9	9	27	16	48
1	1	1	8	8	19	19
Total		PRN = 161		PRN = 291		PRN = 760

Therefore the relative pest risk would rank Oranges as first (PRN = 760), next would be Mangoes (PRN = 291), and finally Apples with a PRN of 161.

One of the strengths of this type of approach is that one can cross-rank pathways whenever there is the need. For example one could compare the risks of Oranges from the Port of New York (example 3; PRN = 760) with Airport Passengers coming through Baltimore (example 1; PRN = 1096).

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This is an outline of what the finished risk assessment would look like and how it would work. It is not intended to be a finished product. BATS cooperation in the development of the AQI monitoring risk assessment is necessary since it is likely that they will be ultimately responsible for the final process and for completion of future AQI monitoring assessments.

APPENDIX 1.

ENHANCED HAZARD RISK ASSESSMENT FOR DETERMINING THE QUARANTINE STATUS OF EXOTIC ORGANISMS (Current Version)

This enhanced hazard risk assessment process is a tool used by APHIS-PPQ-BATS to quickly determine and document the quarantine status of exotic organisms, especially for taxa sent as "Urgent" interceptions. Taxa not formerly evaluated are assessed using the criteria listed below. The taxon is determined as reportable or nonreportable using the attached risk table, and the taxon name is subsequently added to the appropriate pest or tally quarantine status list (dictionary). A record of the evaluation, including citations of references used, is maintained in an electronic file.

Criterion 1: Taxonomy

(H)   Complete species or subspecies identification.

(M)   Generic or higher level identification only and assessor feels comfortable extrapolating information from similar organisms.

(L)   Generic or higher level identification only and assessor not comfortable extrapolating information from similar organisms.

Criterion 2: Hazard Identification/Distribution of Taxon.

(H)   Non-indigenous and not present, but capable of establishment in the U.S.;
        or
        Non-indigenous with limited range in the U.S., and identified as an APHIS program concern or has not been evaluated by APHIS;
        or
        Non-indigenous, present in the U.S., and reached probable limits of range, but genetically different enough to warrant concern and/or vector a foreign plant pest.

(M)   Native, but genetically different enough to warrant concern or to vector an exotic plant pest (that the original taxon could not), and is capable of further expansion or increased damage potential.

(L)   Non-indigenous or native in U.S. and reached probable limits of range and not genetically different enough to warrant concern and/or vector a foreign plant pest,
        or
        Has NOT reached probable limits of range, but no official quarantine exists or is likely to be initiated.

(U)   Unknown, not enough information available to make a choice.

Criterion 3: Agricultural Concern -- known importance.

(H)   Known pest or capable of vectoring known pests of agriculture (crops, forests, animals, beneficial organisms, environment, etc.).

(M)   Not known as a pest of agriculture, but having characteristics that demonstrate a potential for becoming a pest in the U.S.

(L)   Not known as a pest of agriculture and not likely to become an agricultural pest if established in the U.S.

(U)   Unknown, not enough information available to make a choice.

ENHANCED HAZARD RISK ASSESSMENT QUARANTINE STATUS DECISION TABLE		
RISK RATING	**RISK CATEGORY**	**QUARANTINE DECISION**
HIGH RISK TO MEDIUM RISK	HHH HHM HMH HMM HMU HUM MHH MHM MUM LHM LUM	Quarantine Action Required
LOW RISK	HHL HHU HLH HLM HLU HUL HUU MHL MHU MLM MLL MLU MUL MUU LHL LHU LLH LLM LLL LLU LLU LUU	No Action Required
NOT APPLICABLE* (RE-ASSESS)	HML HUH MMH MMM MMH MML MMU MLH MUH LHH LMH LMM LML LMU LUH	invalid risk category combinations

* NOTE: Some ranking combinations are invalid or very unlikely. For example, for taxa above the species level (M or L ranks, Criterion 1), it is not likely that an assessor would know the taxons genetic map (M rank, Criterion 2) or have knowledge that the taxon represents a "known pest" (H rank, Criterion 3).

☐ FOR URGENT INTERCEPTIONS:

    Use the Table to determine quarantine action on imported shipments infested with the rated organism.

☐ TO ADD THE ORGANISM TO EITHER THE PEST OR TALLY LIST:

• First re-assess all organisms with assigned risk categories:

    "L--". The assessor should become comfortable with extrapolating information from similar organisms, before assigning a quarantine status to the taxon.

    "-U- ", "--U", or "-UU". Taxa will not be listed until their presence or absence in the U.S. is known and their potential impact on U.S. agriculture is estimated.

    rated as "not applicable" by the enhanced hazard process (see note, above).

• Add to the Pest List all organisms ranked high-to-medium risk, or to the Tally List all organisms ranked low risk by the enhanced hazard process.